PB-228 610

EVALUATION OF THE KANSAS WATER SUPPLY PROGRAM

Environmental Protection Agency
Kansas City, Missouri

1973

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 228 610

SUMMARY

EVALUATION OF THE KANSAS WATER SUPPLY PROGRAM

WATER SUPPLY PROGRAM

ENVIRONMENTAL PROTECTION AGENCY

REGION VII

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

TABLE OF CONTENTS

	Page No.
PREFACE	1
INTRODUCTION	2
SCOPE OF THE EVALUATION	5
SUMMARY	9
RECOMMENDATIONS	21
PARTICIPANTS	24
STATE AND FEDERAL AGENCY ADDRESSES	26
REFERENCES	27

PREFACE

This SUMMARY is a condensation of the EVALUATION OF THE KANSAS WATER SUPPLY PROGRAM. It presents the significant study findings and major recommendations needed to give Kansas an effective Water Supply Program. For more detailed information concerning the drinking water quality and protection in Kansas, consult a copy of the complete report available from the Kansas State Department of Health and the Environmental Protection Agency.

INTRODUCTION

INTRODUCTION

The Community Water Supply Study[1] revealed numerous inadequacies in the nation's water supply systems. These findings indicated that many public water supplies were failing to meet bacteriological and chemical quality established by the Drinking Water Standards[5] and that operation and maintenance of many water systems were inadequately performed. There were deficiencies noted in many state water supply programs. Many had regulations that were inadequate and surveillance of public water supplies was being neglected. Water supply programs within state environmental control or health agencies are being neglected because of the induced emphasis of other environmental health programs such as waste disposal, air and water pollution control. Legal responsibilities are imposed on and financial assistance is provided to state agency programs in many environmental control program areas. On the other hand, the water supply program has no federal backup legally or financially. Each state must recognize its problems and provide the resources to alleviate them.

Dr. Edwin D. Lyman, Director of the Kansas State Health Department, recognized the importance of an effective state water supply program and utilized the technical assistance of the Environmental Protection Agency for this evaluation of the State Water Supply Program.

The evaluation of the Kansas Water Supply Program was conducted during the spring and summer of 1972. The purpose of the evaluation was to determine the effectiveness of the Kansas Water Supply Program and recommend any needed improvements. The Guidelines used in making the evaluation were "A Guide to the Interstate Carrier Water Supply Program,[10] Manual for Evaluating Public Drinking Water Supplies,[4] and the Public Health Service Drinking Water Standards, 1962."[5]

To perform the evaluation of the Kansas Water Supply Program, the following activities and facilities were reviewed:

1. The Kansas laws, regulations and policies pertaining to the Water Supply Program.
2. The structural organization of the State program and its activities.
3. The available physical and personal resources to accomplish the program objectives.
4. A selected representative sample of the public water supplies was visited and surveyed to determine compliance.
   a. Forty Community Water Supplies.
   b. Twelve of the 44 Communities that are adjusting the fluoride level of their public water supply.
   c. Forty small public water supplies serving the traveling public along I-70 between Topeka and Hays, Kansas.

The findings of the above reviews were analyzed and specific recommendations were developed to assist the State in improving their Water Supply Program.

Definitions of drinking water systems used in this study are as follows:

1. Public water supply system - any system which provides water for public consumption, excluding water sold in bottles or other closed containers.
2. Community water supply systems - a public system that provides water to ten or more premises not owned or controlled by the supplier of water or to forty or more resident individuals.
3. Small public water supply systems - small public water supply systems that: (a) provide water to less than ten premises not controlled by the supplier of water or less than 40 resident individuals; (b) provide water to any number of people on premise-owned or controlled by the supplier of water; or (c) provide water to the traveling public.
4. Individual water supply system - a water supply system that serves a single dwelling unit occupied by one family.

SCOPE OF THE EVALUATION

Water Supplies

The 1970 census indicates that Kansas has a population of 2,246,576 of which 80% are served by approximately 632 public water supplies. The 632 public water supplies includes mobile home parks, state institutions, airports, rural water districts, turnpike authority, rest homes, and 502 systems serving organized municipalities. Public water supplies in Kansas are developed in compliance with Kansas laws, regulations, and policies, and are monitored by the State Department of Health for bacteriological quality. The term "semi-public supplies" is not used in describing water supplies in Kansas. However, it is estimated that there are an additional 1,000 small public water supplies serving water to the public in restaurants, rural schools, gasoline service stations, motels, etc., that are not included in the State surveillance program. The 502 municipal water supplies were divided into six (6) population groups as indicated in the following Table I.

A base of forty community systems supplying water to municipalities was selected for field evaluation. These forty supplies represented less than 10% of 502 municipal systems but 47% of the population served by water supplies monitored by the State Health Department. The number of systems to be surveyed from each of the population groups was selected by considering both the population served by water supplies in these groups and by the number of systems in each

TABLE I

WATER SUPPLY SYSTEMS IN KANSAS

Public Water Supplies

Municipalities

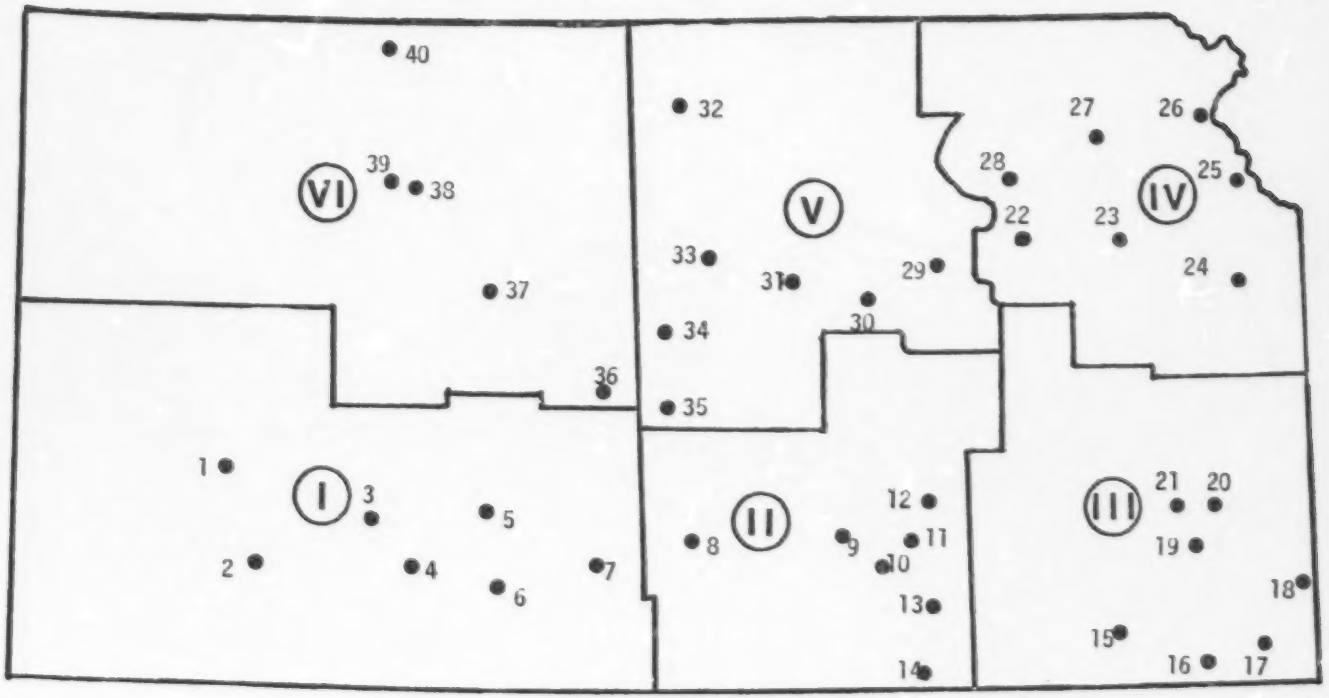
Population Group	Population	No. of Systems	Percent of Population	Systems Selected
More than 50,000	564,173	3	34.2	2
10,000 - 50,000	545,215	30	33.1	13
2,500 - 10,000	262,930	60	15.9	10
1,000 - 2,500	159,424	98	9.7	7
500 - 1,000	70,167	101	4.2	3
Less than 500	48,000	210	2.9	5
Subtotal	1,649,909	502	100.0	40
Unincorporated Communities and small public water supplies	147,352	130		
Total	1,797,261	632		0
Other small public water water supplies		1,000*		40
Individual	449,315	114,000*		0
Total	2,246,576			
No. of Systems Surveyed				80

*Estimated

group. The forty supplies to be evaluated were also distributed as equally as possible over the six areas as demonstrated in Figure I.

(Figure 1)

KANSAS STATE HEALTH DEPARTMENT AREAS AND WATER SUPPLIES SURVEYED



AREA I	AREA II	AREA III	AREA IV	AREA V	AREA VI
1. GARDEN CITY*	8. KINGMAN	15. INDEPENDENCE	22. WAMEGO	29. JUNCTION CITY	36. GREAT BEND
2. COPELAND	9. WICHITA*	16. OSWEGO	23. TOPEKA**	30. ABILENE	37. HAYS*
3. DODGE CITY	10. DOUGLASS	17. COLUMBUS	24. GARDNER	31. SALINA*	38. BOGUE
4. BUCKLIN	11. AUGUSTA	18. PITTSBURG	25. LEAVENWORTH	32. JEWELL	39. HILL CITY
5. KINSLEY	12. EL DORADO	19. CHANUTE*	26. ATCHISON	33. BEVERLY	40. NORTON
6. BUCKLIN	13. ATLANTA	20. MORAN	27. HOLTON	34. ELLSWORTH	
7. PRATT	14. ARKANSAS CITY	21. IOLA	28. WESTMORELAND	35. LYONS	

*Area Office of State Health Department **Area and Central Offices of State Health Department

SUMMARY

Program Review

Authority

Statutes

The Kansas statutes give broad authority to the State Board of Health for regulating public water supplies and administrative responsibility to the State Health officer for carrying out these acts.

Regulations

Only two regulations have been initiated that pertain to public water supplies: one pertaining to collection and analysis of water for quality control; and, one for the application of permits to supply water for domestic purposes.

Policy

The Kansas State Department of Health has developed a number of policy documents relating to the design and operation of public water supplies much of which should be incorporated in regulations.

Organization and Activities

The Public Water Supply Program is a function of the Water Quality Control Section under the Division of Environmental Health in the State Health Department. The Water Quality Control Section Chief devotes about 30% of his time to the administration of the Water

Supply Program. Area engineers and/or technicians in the six area offices devote about 20% of their activities to the Water Supply Program.

Two of the three individuals in the central office have obtained professional registration and master degrees. The other individual has a bachelor degree and is fulfilling the Engineering-in-Training (EIT) requirements. Four of the ten personnel in the area offices have acquired professional registration; two of them have bachelor degrees, one has a masters degree and the other one does not have a college degree. The other six area technicians have attended various colleges and universities but have not obtained their degrees.

Engineering Surveillance

With this available manpower only 20% of the public water supplies have been surveyed annually. Small public water supplies are not routinely inspected.

Engineering and Technical Assistance

There are approximately 100 sets of plans and specifications reviewed annually requiring one man-year of effort. Many small public water supplies fail to submit plans and specifications prior to construction.

An additional .5 man-year is expended for providing water supply information to various governmental agencies, institutions and private organizations.

Operator Training

There are three area schools each year but only one day is devoted to water supply in each school.

The Annual Water and Sewage Works School has 20 hours of instruction in water supply and waste treatment.

Correspondence courses are available through State and Federal programs at a nominal fee to the operator.

Due to the lack of contact with State personnel, small public water supply operators are not encouraged to attend training courses.

Status of the 40 Community Water Supply Systems

There are 632 public water supply systems in Kansas serving an estimated population of 1,780,634. Detailed sanitary surveys of 40 selected systems revealed the following:

Water Quality - Bacteriological

Eight water systems (20%) serving a population of 27,193 failed to meet the coliform limits of the DWS for one or more months during the 11 months review period.

Water Quality - Chemical and Physical

Eighteen water systems (45%) serving a total population of 134,922 failed to meet one or more of the chemical and physical standards of the DWS.

Sixteen water systems (40%) serving a total population of 120,672 failed to meet one or more recommended or mandatory standards.

Two water systems (5%) serving a total population of 14,250 failed to meet the recommended physical limits. In addition, there were two supplies serving a total population of 20,192 that failed to meet the mandatory chemical limits.

Source

Two water systems (5%) serving a population of 6,662 had inadequate quantities of water.

Two water systems (5%) serving a population of 35,743 had sources which required improvements.

Treatment

All of the supplies (100%) had facilities for disinfecting; however, six systems (15%) did not have a free chlorine residual in the system at the time of the survey.

Fourteen water systems (35%) need additional treatment facilities.

Distribution

Two water systems (5%) serving a total population of 17,972 need additional distribution storage facilities.

One water system serving a population of 274,448 has inadequate water pressure in some parts of the distribution system during certain times.

Quality Control

Fifteen water systems (38%) had less than adequate quality control records.

Eleven water systems (28%) did not keep quality control records.

Four systems (10%) kept only partial control records.

Twelve water systems (30%) serving 21,168 consumers did not have an ordinance against cross-connections.

Seven water systems (18%) had plumbing codes but no inspections or enforcements were prevalent.

Only one water system surveyed was developing a program for continuous reinspection for removal of cross-connections.

Quality of Operation

Twenty-one water systems (53%) had no certified operators.

Six of the nine water systems (67%) which exhibited operation problems employed operators that were not certified.

Seven operators (88%) in charge of the eight supplies that failed to meet adequate bacteriological quality were not certified.

Four operators (67%) were not certified in the six systems which were not properly disinfected.

Ten operators (67%) were not certified in the 15 systems that had inadequate control records.

Bacteriological Surveillance

Twenty-one water systems (52%) serving 148,548 individuals exhibited inadequate bacteriological surveillance.

Five water systems (13%) did not collect any samples during some months.

Chemical Surveillance

The state performs one chemical analyses from a well or the distribution system from each community water supply annually. In most instances this is adequate in number; however, only eight of the 20 substances routinely analyzed are listed in the Drinking Water Standards.

Engineering Surveillance

Twenty-nine water systems (73%) had not received formal inspections by State personnel during the past 12 months.

Status of Public Water Systems Adjusting Fluoride Levels

Forty-four public water systems have facilities for fluoridation. The field survey of 12 systems revealed the following:

Optimum Fluoride Level

Nine (75%) evidenced a fluoride ion content in the distribution system within the 0.8-1.2 mg/l range.

Laboratory Control

Five (42%) were not conducting daily fluoride analysis. Adequate analytical equipment was not available in five (42%) of the facilities surveyed.

Chemical Feed Equipment

Four (33%) had deficient equipment and only four (33%) of the chemical feeding arrangements were acceptable.

Chemical Storage and Handling

Five (42%) had unsatisfactory storage arrangements.

Operators Training and Interest

Three (25%) had operators that were inadequately trained in the use of test equipment.

Three (25%) were operated by personnel not completely familiar with their equipment.

Three (25%) had operators who did not favor feeding fluoride.

Surveillance

Three (25%) had not collected the required number of check samples.

Only three (25%) had been visited during the past 12 months by a representative of the State Health Department.

Status of Water Systems Serving the Traveling Public

There are estimated to be approximately 1,000 small public water supply systems in Kansas serving the public at rural schools, highway rest stops, restaurants, service stations and motels along Kansas highways. Forty of these systems that were providing water to the traveling public were studied and the following results were obtained:

Water Quality

Thirty-five (88%) of the water systems surveyed along I-70 in Kansas failed to meet the constituent limits of the U.S. Public Health Service Drinking Water Standards.

Thirty-four (85%) of the water systems surveyed failed to meet at least one recommended limit for chemical and physical quality.

Six (15%) of the water systems surveyed failed to meet at least one mandatory chemical limit.

Nine (23%) of the water systems surveyed failed to meet the bacteriological quality limit.

Sources

Generally, the sources were sufficient to provide the quantities of water needed although signs were placed at the safety rest areas

being served by hand-pumped wells warning visitors to conserve water.

Treatment

Two of the water systems surveyed had facilities for chlorination although they were not in use.

Distribution

Five (13%) of the water systems surveyed had low pressure (<20 psi) in some area of the distribution system.

Bacteriological Surveillance

None of the water systems surveyed had an adequate bacteriological surveillance program except for the three systems that were being served by municipal systems. The State Highway Commission submits one sample per month for the safety rest areas under their jurisdiction, however, this is not practiced during the winter months. There was no record of any bacteriological analysis for the commercial establishments.

Chemical Surveillance

Thirty-seven (93%) of the water systems surveyed were not subject to a regular program of chemical surveillance. The safety rest areas water systems had been analyzed for chemical quality immediately following their installation. There was no record of chemical surveillance at the commercial establishments except those being served

by a municipal system.

Engineering Surveillance

Only the three water systems being served from a municipal water system, whose plans had been reviewed and approved by the State Department of Health, were subject to engineering surveillance.

RECOMMENDATIONS

The Kansas Water Supply Program should pursue the enforcement of the existing statutes pertaining to public water supplies and strive for an interrelated program with other state and local enforcement agencies to administer the statutes enacted for safeguarding public health.

A document of collected statutes, regulations, and program policies relating to the Water Supply Program should be prepared for distribution to municipalities, corporations, companies and individuals supplying water for domestic purposes to the public.

Program Resources

The budget of the Water Supply Program should be increased $723,347 for the following purposes:

a. $210,829 for engineering surveillance of 502 community water supplies and 1,130 small public water supplies.

b. $140,284 for chemical surveillance of the 1,632 public water supplies.

c. $214,534 for bacteriological surveillance of the 1,632 public water supplies.

d. $7,700 for training of Water Supply Program personnel.

e. $125,000 to hire personnel to administer a training program created by adoption of mandatory certification.

f. $25,000 to hire personnel to develop and administer a well drillers licensing program.

Administrative Action

a. The State Board of Health should promote salary increases and benefits for State employment to compete with industry, institutions, other states, and federal government agencies. An active recruitment program should be initiated at State universities and colleges to provide the opportunity for qualified engineering graduates to become familiar with the program.

b. Develop rules and regulations to enforce program requirements that are assembled in the program policies. A regulation to adopt DWS would provide authority for the State Department of Health to administer a good Water Supply Program.

Program Action

a. Require monthly operating reports from public water supplies indicating daily water use, chemicals used in treatment, analytical results of routine analyses and any operational problems that may occur.

b. Provide annual inspections of all public water supplies to avoid potential health hazards that may occur in the source, distribution system, treatment facilities or operation of the facility, to assure a safe and dependable water supply.

c. Develop and maintain current water supply inventories with the use of automatic data processing techniques for storage, analysis and retrieval of data.

d. The Water Supply Program should coordinate its activities and responsibilities with the Kansas Food Service and Lodging Board, State Department of Education, and other state and local agencies that are concerned with water supplies serving the public.

Legislative Action

a. Promote and support legislation requiring mandatory certification of operators in the water works field. This program should be under the supervision of State Health Department personnel.

b. Adopt a statute requiring the licensing of well drillers with the State Health Department having major administrative responsibilities.

c. Revise Statutes 65-162 and 65-163 to clarify that permits for additional sources of supplies, treatment facilities and treated water storage must be submitted to the State Health Department for approval prior to construction of these facilities instead of getting approval prior to use.

d. Adopt the proposed legislation for mandatory fluoridation of public water supplies, with the provisions for adequate training, monitoring and surveillance of the systems to assure the public of an optimum level of protection against tooth decay.

PARTICIPANTS

The following Environmental Protection Agency personnel and laboratories made a major contribution to the successful completion of this study:

Study Coordination and Report Preparation

Otmar O. Olson, Head, Water Supply Section, Surveillance and Analysis Division - Region VII

T. Jay Ray, Water Supply Specialist, Water Supply Section, Surveillance and Analysis Division - Region VII

Blanche M. Anderson, Secretary, Water Supply Section, Surveillance and Analysis Division - Region VII

Field Evaluation

Keith Boyd, Staff Engineer, Water Supply Division, Washington, D.C.

Curtis Fehn, Staff Engineer, Water Supply Division, Washington, D.C.

Thomas Hushower, Fluoridation Engineer, Water Supply Division, Washington, D.C.

Harry D. Nash, Microbiologist, Water Supply Programs, Cincinnati, Ohio

Earl McFarren, Supervisory Chemist, Water Supply Programs, Cincinnati, Ohio

T. Jay Ray, Water Supply Specialist, Water Supply Section, Surveillance and Analysis Division - Region VII

Otmar O. Olson, Head, Water Supply Section, Surveillance and Analysis Division - Region VII

Laboratory Support

Fluoride Laboratory, Water Supply Division, Washington, D.C.

Water Supply Programs Laboratory, Cincinnati, Ohio

Water Supply Programs Laboratory, Narragansett, Rhode Island

Water Supply Programs Laboratory, Dauphin Island, Alabama

We would like to thank Mr. N. Jack Burris, Chief of the Water Quality Control Section, Kansas State Department of Health, and his staff who so earnestly cooperated in this evaluation:

Leonard J. Imhof, Sanitary Engineer

Lloyd W. Rogers, Sanitary Engineer

L. Dean Strowig, Sanitary Engineer

Thomas Reeves, Sanitary Engineer

Major C. Hagar, Sanitary Engineer

Gerald P. Grant, Engineering Technician

James L. Current, Engineering Technician

STATE AND FEDERAL AGENCY ADDRESSES

A. State:

Kansas State Department of Health
Division of Environmental Health
Water Quality Control Section
535 Kansas Avenue
Topeka, Kansas 66603
Telephone: 913-296-3825

B. Federal:

Environmental Protection Agency, Region VII
Surveillance and Analysis Division
Surveillance Branch
Water Supply Section
1735 Baltimore Avenue
Kansas City, Missouri 64108
Telephone: 816-374-5971

REFERENCES

1. Community Water Supply Study - Analysis of National Survey Findings, Bureau of Water Hygiene, July, 1970, 111pp.

2. 1962 Public Health Service Drinking Water Standards, Public Health Service Publication No. 956, Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, 61pp.

3. A Guide to the Interstate Carrier Water Supply Certification Program, EPA, Office of Water Programs, Division of Water Hygiene, Publication dated June, 1971.

4. Manual for Evaluating Public Drinking Water Supplies, Public Health Service Publication No. 1820, Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, 1969, 62pp.